UNDERSTANDING ELECTROMAGNETISM: A NEW APPROACH

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As we know, in nature, nothing occurs unnecessarily, e.g., our hearts beat persistently without having any source of infinite energy, not unnecessarily; there is an important purpose as to why they beat persistently, and they have special structure, unlike simple balloons of blood, that keeps them beating persistently and provides all the properties our hearts possess. And therefore, as electrons, nucleons etc. all the particles possess persistent spin motion without having any source of infinite energy and several properties; there should positively be some important purpose as to why they possess persistent spin motion, and they should have special structure, unlike simple balloons of charge, that keeps them spinning persistently and provides all the properties they possess. Further, as all the phenomena/activities related with our hearts, e.g., continuous blood circulation etc. taking place in our bodies are the effects of the purpose behind persistent beating of our hearts and their special structure, similarly, all the activities/phenomena related with electrons, nucleons etc. taking place in their systems should be the effects of the purpose behind their persistent spin motion and their special structure. And therefore, presently, that purpose and the special structure of electrons have been determined. Their accounts enable to give very clear and complete explanation as to how electromagnetism is generated in electron beams and current carrying specimens, which type of magnetism is generated, how a magnetic field which possesses direction, is generated around them in a plane perpendicular to the direction of flow of electrons through them Their accounts enable to give very clear and complete explanation of related other phenomena too. Finally, two very important possible effects have been speculated and explained.

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1. INTRODUCTION

As we know, as soon as electrons, protons and neutrons etc. start flowing in their respective beams and the electrons start flowing through the electric current carrying specimens, an electromagnetism is generated in them, and a magnetic field, which possesses direction, is generated around and along their length in a plane perpendicular to the direction of flow of particles through them. When no current flows through the specimens, no magnetism in them and no magnetic field around them are generated. But currently no explanation is found of any of the above phenomenon/event anywhere.

Further, as we know, electrons, protons etc. are bound together in their respective beams despite similar charges on them. Neutrons (having zero net charge) are also bound together in their beams though their beams do not persist as long as the electron and the proton beams persist because the neutrons, after their mean life time start decaying. These examples lead to conclude that, between electrons, between protons and between neutrons in their respective beams, a force, stronger than the Coulomb repulsive force and independent of charge is also generated. But currently, no knowledge is available anywhere about this force, and how it is generated.

As the generation of a force of attraction between electrons, between protons and between neutrons in their respective beams, the generation of electromagnetism in beams and current carrying specimens, and the generation of magnetic field around them etc. all the phenomena/events take place simultaneously as soon as the electrons, protons and neutrons start flowing through their respective beams and the electrons start flowing through the specimens, otherwise not, it leads to conclude:

1. Electrons protons and neutrons etc. possess some property (see Sec. 2) that generates linear velocity in them. And when some voltage is applied across the specimens and across the electron guns to make the electrons to flow through them, the directions of

linear velocity of electrons are oriented in one direction. Otherwise, due to the possible collisions of electrons among themselves and consequently their deflections in different directions, especially when the electron beams deviate up and down, or left and right in CRO (cathode ray oscilloscope), the beams cannot persist as such. (For confirmation that, due to voltage or external electric field, the directions of linear motion of electrons are oriented, see Sec. 4.5.)

2. The electrons, protons and neutrons possess some special structure (see Sec. 3), unlike simple balloons of charge. And according to their special structure, they possess some magnetism too by the virtue of nature as they possess charge, and in such a manner and form that when the directions of their linear velocity are oriented in one direction, their magnetism and magnetic fields are also oriented simultaneously in such a manner that a resultant magnetism is generated in their beams and specimens, and due to interactions between their magnetic fields, an attractive force is generated between them and a magnetic field is generated around and along the length of beams and specimens in a plane perpendicular to the direction of flow of electrons, protons and neutrons in their beams and electrons through the specimens.

The above conclusions cannot be ruled out because, as we know, electrons, nucleons etc. all the particles possess persistent spin motion without having any source of infinite energy and several properties; there should positively be some important purpose as to why they possess persistent spin motion, and they should have some special structure, unlike simple balloons of charge, that keeps them spinning persistently and provides all the properties they possess. For example, our hearts beat persistently without having any source of infinite energy, there is an important purpose as to why they beat persistently, and they have special structure, unlike simple balloons of blood that keeps them beating persistently and provides all the properties our hearts possess. Further, as all

the phenomena/activities related with our hearts, e.g., continuous blood circulation etc. taking place in our bodies are the effects of the purpose behind persistent beating of our hearts and their special structure, similarly, all the phenomena/activities related with electrons, nucleons etc. taking place in their systems, e.g., their beams, deuterons, alpha particles, nuclei and specimens should be the effects of the purpose of persistent spin motion of electrons, nucleons etc. and their special structures.

Presently, that purpose (see Sec. 2) and the special structures of electrons, protons and neutrons (see Sec. 3) have been determined. The determined purpose fulfills the mentioned above first conclusion, and the special structure fulfills the second conclusion. And consequently, their determinations enable to:

1. Give very clear and complete explanation of: i. How electromagnetism is generated in electron beams and current carrying specimens (see Sects. 4.1 and 4.2 respectively); ii. Which type of magnetism (electromagnetism) is generated (see Sects. 4.3 and 4.4); iii. How a magnetic field is generated around them in a plane perpendicular to the direction of flow of electrons through them (see Sects. 4.1 and 4.2 respectively); iv. How that field possesses direction (see Sects. 4.1 and 4.2 respectively).

2. Determine a new force (see Sects. 4 and 5, Ref. 1) with characteristics of nuclear force (see Sec. 6, Ref. 1) and both attractive (see Sects. 4.1 and 5.1, Ref. 1) and repulsive components (see Sects. 4.2 and 5.2, Ref. 1).

The attractive component of the generated force enables to: i. Explain as to how electrons, protons etc. are held together in their respective beams despite having similar charges on them (see Sec. 4.1); ii. Explain as to how an energy gap is generated between electrons at their superconducting state and at their normal state (see Sec.7.9, Ref. 2); iii.

Give almost a complete understanding about the structures, properties etc. of deuterons, alpha particles and nuclei (see Sec. 4, 5, 6, 7, 8 and 9, Ref. 3).

And the repulsive component of the generated force enables to give a complete understanding as to how the emissions of alpha (α) and beta (β) particles take place from the nuclei (Sec. 9.2.1, Ref. 3).

Currently it is believed that electron is a ball of charge and the generation of electromagnetism in electron beams and electric current carrying specimens and the generation of magnetic field around them etc. take place due to the flow of charge of electrons through them. It is true that the above phenomena/events take place when the electrons start flowing through them but it cannot be true that the above phenomena/events take place due to the flow of charge of electrons through them. Because magnetism and magnetic fields etc. cannot be generated due to charge of electrons whether the electrons are moving or spinning, similarly as, charge and electric field cannot be generated due to a magnet of same size whether this magnet is moving or spinning. Secondly, as soon as the electrons start flowing in their beams, a force of attraction is also simultaneously generated between electrons which keep electrons bound together in their beams against the repulsive Coulomb force generated between them due to similar charge on them. Can this force of attraction also be generated due to similar charge on electrons? No.

Currently, it is also believed that due to the spin motion of charge of electron, the electron possesses magnetic field and spin magnetic moment (μ_S)

$$\mu_S = (-e/2m)\,L_S \quad \text{.....} \quad (1)$$

[where $-e$ and m respectively are the charge and mass of electron and L_S is its spin angular momentum].

And due to the orbital motion of charge of electron, there are generated a magnetic field around the orbital path of electron and orbital magnetic moment (μ_L)

$$\mu_L = (-e/2m)\, L_L \text{ .....} \quad (2)$$

[where L_L (= m v r in which r is the radius of the orbit and v is the tangential speed of electron) is the orbital angular momentum of electron about the axis of rotation around its orbit].

But these beliefs too cannot be true because these give rise to numerous very basic and fundamental questions. For example:

1. How and from where does the electron obtain spin motion and how does that (spin motion) persist without having any source of infinite energy?

2. The charge of electron which possesses electric field around it by the virtue of nature, how can it (charge) possess a magnetic field too because of its spin motion?

3. Can the charge of electron generate μ_S , μ_L and two magnetic fields: 1st - around the electron due to its spin motion, and 2nd - around its orbital path due to its orbital motion simultaneously?

4. Supposing, the two fields (1st and 2nd) are generated simultaneously, then during the orbital motion of electron, the 1st magnetic field (generated around the electron) shall have to go on passing through the 2nd magnetic field (generated around the orbital path) continuously. Can it be possible? And if possible, what will then happen?

In addition to the above faults, when the classical result of μ_S was compared to the measurement, it was found off by a proportional factor g and therefore the expressions (1) and (2) were corrected multiplying respectively with correction factors g_S and g_L as

$$\mu_S = g_S(-e/2m)\, L_S \text{ .....} \quad (3)$$

and

$$\mu_L = g_L(-e/2m)L_L \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (4)$$

The dimensionless correction factor g is known as g factor. The spin g factor g_S (= 2) comes from the Dirac equation, a fundamental equation connecting the electron's spin with its electromagnetic properties. And the orbital g factor g_L (= 1) comes by a quantum mechanical argument analogous to the derivation of the classical gyromagnetic ratio.

And as in eqn. (3), μ_S is related to L_S and in eqn. (4), μ_L is related to L_L, similarly, the total magnetic dipole moment (μ_J) resulting both from spin and orbital angular momentum of electron is related to total angular momentum $L_J = L_L + L_S$ by

$$\mu_J = g_J(-e/2m)L_J \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (5)$$

where g_J is known as the Lande g factor which can be related to g_L and g_S by quantum mechanics.

For g_S, the most accurate value has experimentally been determined, which is equal to 2.00231930419922 ± (1.5×10^{-12}). It is only two thousand larger than the value from the Dirac equation. The small correction is known as the anomalous magnetic dipole moment of the electron.

But on the name of spin orbit interaction, to determine μ_J as μ_J [= g_J $(-e/2m)L_J$, where L_J = jh /2π, j = s ± l and s, l and j respectively are the spin, orbital and total quantum numbers, and correction factor g_J has been excluded] = ($\mu_S \pm \mu_L$) is neither judicious nor meaningful. Because expression L_J = jh /2π [= (s ± l) h/2π = L_S

$\pm L_L$] is not true. In it, L_L = lh/2π can be accepted because L_L = lh/2π is according to postulate of Bohr's theory, but L_S = sh/2π cannot be accepted, because, regarding spin motion of electron, there is no postulate. Secondly, since μ_S is magnetic moment of electron which acts in direction opposite to the direction of L_S, and L_S acts along the perimeter of the orbit tangentially at its every point (see Sec. 6.1), μ_S acts in the plane of orbit, while μ_L is magnetic dipole moment of the orbit of electron and acts along the axis of the orbital motion of electron, i.e. normal to the plane of the orbit and through its centre, then how can their vector sum be taken?

Further, the quantum numbers l (orbital), s (spin) and j (total) are just like the mathematical tools, and to these the values (e.g. 0, 1, 2, 3, …to l, and 1/2, -1/2 to s) are assigned accordingly as the requirements demand in order to arrive at the desired results. These have neither any physical significance nor any physical interpretation. Furthermore, the assignment of two values (1/2 and –1/2) to s cannot be true. Because electron spins always in a plane perpendicular to the direction of its orbital velocity and in clockwise direction (see Sec. 6.1), and hence to s, only one value can be assigned, not two values (1/2 and –1/2). Therefore, j (= s ± l) can have only one value corresponding to each value of l, not more than one value.

Now, when: i. The determination of μ_J is neither judicious nor meaningful; ii. The expression L_J = jh/2π is not true; iii. j (= s ± l) can have only one value corresponding to each value of l, not more than one value; the existing explanation of fine structure of spectral lines cannot be true.

The presently determined purpose as to why electrons possess persistent spin motion gives very clear and complete explanation of why and how the fine structure of

spectral lines, variations in their numbers, frequencies and intensities etc. take place (see Sects. I, J and K, Ref. 4) without taking any account of eqns. (3) and (5), quantum numbers s, l, j, selection rules, and g factor etc.

2. DETERMINATION OF THE PURPOSE AS TO WHY ELECTRONS, PROTONS AND NEUTRONS ETC. POSSESS PERSISTENT SPIN MOTION

The spin motion of electrons, nucleons etc. all the spinning particles generate the following two properties in them:

2.1 First property

The spin motion of spinning particle generates the tendency of linear motion in it along the direction of its spin angular momentum L_S (for verification of its truth, see Sec. I B, Ref. 4). And as electron, nucleon etc. all the particles possess spin motion; a tendency of linear motion is generated in them along the directions of their respective L_S.

If the frequency of spin motion of such a particle is increased by some means, a stage comes when the particle starts moving itself along the direction of its L_S. Then after, as the frequency of spin motion of particle increases, the velocity of particle goes on increasing in accordance to expression[4]

$$v^2 = h\omega / m \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (6)$$

where m, v and ω respectively are the mass, linear velocity and frequency of spin motion of the particle, and h is Planck's constant [for verification of the truth of expression (6), see Sec. I A, Ref. 4].

Electrons, nucleons etc. all the particles probably possess such amount of frequency of spin motion that keeps them always moving with some linear velocity (v). And consequently, they are found always in moving state, not in position of rest, and

their motions are always oriented along the directions of their respective L_S. Their linear velocity (v) varies as the frequency of their spin motion (ω) varies, according to expression (6).

2.2 Second property

As a particle, due to its linear motion, obtains kinetic energy (E_K), and due its kinetic energy (E_K), obtains its linear momentum (p_{LIN}), similarly, due to its spin motion, it obtains spin energy ($E_S = h\omega/2$, for detail, see Sec. II, Ref. 4), and due to its spin energy, it obtains spin momentum ($p_S = h\omega/\mathrm{v}$, see Sec. II, Ref. 4). [For verification of the truth that the particle obtains p_S due to its spin motion, see Sec. I C, Ref. 4.]

And therefore, electrons, nucleons etc. all the particles possess motional energy (E_M) = $E_K + E_S$ and motional momentum (p_M) = $p_{LIN} + p_S$. And whenever arises the situation of conservation of energy and momentum etc. of electrons, nucleons etc. during their motion, their E_M , p_M and L_S actually conserve, not their E_K and p_{LIN} . [For verification of the truth of conservation of p_M , see Sec. I D, Ref. 4. And for how E_M , p_M and L_S conserve, see Sec. 3.1.1, Ref. 5.] Due to conservation of E_M , p_M and L_S of electrons, nucleons etc., no violation of the laws of conservation of their energy and momentum etc. happens to be possible, even, e.g.: 1. During motion of electron along its elliptical orbit, where the velocity of electron varies; 2. During motion of electron (accelerated by a large voltage), after attaining relativistic velocity by it, when the rate of increase in its velocity starts decreasing (see Sec. 2.2, Ref. 5).

3. DETERMINATION OF SPECIAL STRUCTURE OF ELECTRONS, PROTONS AND NEUTRONS THAT KEEPS THEM SPINNING PERSISTENTLY AND PROVIDES ALL THE PROPERTIES THEY POSSESS

3.1 Determination of the special structure of electrons

The current concept about the structure of electron that it is like a ball of charge (-e), and the magnetic field, spin magnetic moment (μ_S) etc. properties it possesses are obtained due to spin motion of its ball of charge is not true (see Sec. 1).

The electron has special structure, unlike simple ball of charge (-e). It possesses a bundle of magnetism too by the virtue of nature as it possesses a bundle of charge ($-e$) by the virtue of nature. And the magnetic field the electron possesses occurs due to this magnetism. The magnetism the electron possesses occurs in the form of a circular ring, shown by a dark solid line circle around the charge of electron, Fig. 1(a), where charge has been shown by a spherical ball, as for example, around the planet Saturn, there occurs a ring. Around the ball of charge of electron, there occurs its electric field (which has not been shown in figure), and around the ring of magnetism of electron, there occurs its magnetic field shown by broken line circles, Fig. 1(a). The ring of magnetism and the ball of charge of electron both spin with frequencies ω_{EM} and ω_{EC} respectively, but in directions opposite to each other, shown by arrows in opposite directions, Fig. 1(b), where the ball of charge has been shown by quite a thick dark line circle and the ring of magnetism by comparatively a thinner dark line circle.

The spin motion of the ring of magnetism and the ball of charge of electron in directions opposite to each other is the special characteristic of the special structure of electron, because when they spin in directions opposite to each other, there is created such situation (see Sec. 3.2, Ref. 5) and their fields interact (electromagnetic interaction) with each other such that their spin motion persists.

When the ring of magnetism and the ball of charge of electron spin with frequencies ω_{EM} and ω_{EC} respectively, due to their spin motion, the linear velocities v_{EM}

and v_{ES} respectively are generated in them according to expression (6) along the directions of their respective spin angular momentum L_{SM} and L_{SC}. And consequently, electron obtains linear velocity v_E ($= v_{ES} - v_{EM}$ or $= v_{EM} - v_{ES}$) along the direction of its spin angular momentum L_S which (L_S) is generated in electron due to the frequency of its spin motion ω_E, where ω_E is corresponding to v_E of the electron obtained according to expression (6). During motion of electron along its elliptical orbits or after attaining relativistic velocity by it, the frequency of spin motion ω_E of the electron corresponding to its linear velocity v_E ($= v_{ES} - v_{EM}$) is obtained according to expression[5] (2).

The μ_S the electron possesses, is generated due to the spin motion of its ring of magnetism and occurs along the direction of L_{SM}. As normally v_E occurs along the direction of L_{SC} (for detail, see Sec. 3.1.1, Ref. 5), and L_{SC} occurs in direction opposite to the direction of L_{SM}, v_E occurs in direction opposite to the direction of μ_S.

3.2 Determination of the special structure of protons and neutrons

For the special structure of protons, see Sec. 3.1.2, Ref. 5, and for neutrons, see Sec. 2, Ref. 6.

4. EXPLANATION OF HOW A FORCE OF ATTRACTION AMONG ELECTRONS, ELECTROMAGNETISM AND MAGNETIC FIELD IN ELECTRON BEAM AND CURRENT CARRYING SPECIMEN ARE GENERATED

4.1 Explanation of how electromagnetism is generated in electron beams and magnetic field around them in a plane perpendicular to the direction of flow of electrons through them, and how that field possesses direction

As electrons, due to their persistent spin motion possess v, L_S, E_m and p_m, where their v occurs along the directions of their respective L_S, and due to their structures, the planes of their magnetic fields occur in a plane perpendicular to the directions of their respective v (or can say L_S), in electron beams, when external electric field is applied to accelerate their electrons, the directions of v of their electrons are oriented and aligned along the direction of the applied external electric field (for confirmation of its truth, see Sec.4.5), and subsequently, the planes of magnetic rings and magnetic fields of their electrons are oriented and aligned in a plane perpendicular to the direction of the applied external electric field (or can say, in a plane perpendicular to the direction of flow of electrons). Further, as μ_s of electron occurs in direction opposite to the direction of L_S of electron, the directions of μ_s of all the electrons of the beam are oriented and aligned in direction opposite to the direction of motion of electrons in their beams.

Therefore, as the consequence of alignment of the direction of μ_s and the planes of magnetic rings of the electrons of the beam, magnetism (electromagnetism), which happens to be diamagnetism (see Sec. 4.3, and for its experimental confirmation, see Sec. 4.4) is generated in the beam, and its magnetic moment occurs along the direction of alignment of μ_s of the electrons of the beam. And, as the consequence of the alignment of the planes of magnetic field of the electrons of the beam, there is created such situation, Fig. 2, between every pair of its (beam) two electrons lying adjacent to each other and in the same trans-cross sectional plane that, due to interaction between their magnetic fields, a force of attraction is generated between them (how it is generated, see Sec. 4.1, Ref. 1) and their magnetic fields acquire the form as shown in Fig. 2. Similarly, a force of attraction is generated between electrons lying in all the trans-cross sectional planes, lying along the length of the beam them. (how it is generated, see Sec. 4.1, Ref. 1) and

their magnetic fields acquire the form as shown in Fig. 2. And thus, finally a force of attraction is generated among all the electrons of the beam, and around and along the length of the beam a magnetic field is generated as shown in Fig. 3. This magnetic field obviously occurs in a plane perpendicular to the direction of flow of electrons, and it possesses direction, i.e. anticlockwise, similarly as the magnetic fields of electrons possess anticlockwise direction (if the electron is moving towards the face of clock).

4.2 Explanation of as to how electromagnetism is generated in the current carrying specimens and magnetic field is generated around them in a plane perpendicular to the direction of flow of current through them, and how that field possesses direction

As we know, photons are emitted from the orbiting of the substances and their emission goes on continuously, some photons remain always in the specimens despite their absorption again in the specimens and emission out from the surfaces of the specimens. They, during their stay/existence in the specimens, go on travelling here and there inside the specimens and collide with the free electrons of the specimens found in their way and resist the free electrons to move persistently along the directions of their velocity v. And hence, when no voltage is applied across the ends of the specimens, due to their collisions with photons, the directions of v of the free electrons of the specimens are found randomly oriented in all the different directions of the specimens.

When some voltage is applied across the ends of the rod, the randomly oriented directions of v (i.e. L_s) of its free electrons are oriented and aligned opposite to the direction of the applied electric field (for confirmation of its truth, see Sec. 4.5) and they start flowing along the direction of their v, i.e. parallel to the direction of the applied electric field. The applied electric field does not let the alignment of v of electrons to be disturbed due to collisions with the photons existing there inside the rod. When the

directions of v of electrons are oriented and aligned, the directions of μ_s of electrons are also oriented and aligned parallel to the direction of electric field but opposite to the direction of alignment of v of electrons. And the planes of their magnetism and magnetic fields are oriented and aligned in a plane perpendicular to the direction of the applied electric field, or can say perpendicular to the direction of flow of electrons.

When the electrons start flowing through the current carrying rod, they flow through the different inter-lattice passages of the rod. Then the electrons flow through every inter-lattice passage of the rod in the form of number of queues. Their flow in such a manner can be assumed as, through every inter-lattice passage, the electrons are moving in the form of a beam, as shown in Fig. 4. The magnetic fields generated around the so called beams passing through inter-lattice passages, say 1, 2, 3, 4,……. interact as shown in Fig. 4, similarly as magnetic fields around electrons interact, as shown in Fig. 2. And consequently, a force of attraction is generated between all the so called beams and the beams are bound together. And electromagnetism is generated in the rod and magnetic field is generated around and along the length of the rod in a plane perpendicular to the direction of motion of electrons in the rod. As the magnetic field of all the electrons and hence of the beams possess direction (i.e. anticlockwise, if the electrons are moving towards the face of clock), the generated magnetic field around and along the length of the rod also possesses the same anticlockwise direction.

4.3 Explanation of which type of magnetism (electromagnetism) is generated in electron beams and current carrying rods

It is believed that diamagnetism is a property generated in specimen due to its free electrons, and as we see above in Sects. 4.1 and 4.2 that the electromagnetism is

generated in electron beams and current carrying rods due to their free electrons, the generated electromagnetism in them should be diamagnetism.

Further, as we know, when some electric current is allowed to flow through a specimen at its normal state and when some persistent current starts flowing through the specimen at its superconducting state, in both the cases, magnetism is generated in the specimen. When in both the cases, magnetism is generated in the specimen, and it is generated due to the same cause, i.e. due to the flow of current through the specimen, the generated magnetism in both the cases should be of same type. Since it is believed that when persistent current starts flowing through the specimen rod at its superconducting state, diamagnetism is generated in the specimen rod, the generated magnetism in the specimen rod at its normal state should also be diamagnetism (for its experimental confirmation, see the Sec. 4.4).

4.4 Experimental confirmation that the magnetism (electromagnetism) generated in electron beams and current carrying rods is diamagnetism

Let us consider a specimen rod over which a primary and a secondary coil are wound. The primary is connected to the battery through a key and the secondary is connected to a ballistic galvanometer. If some electric current is allowed to flow through the rod, a kick in the galvanometer reading is observed, which means, some magnetism has generated in the rod and due to that a change of flux has taken place.

If we take the specimen rod in the form of a close loop and it is brought down to its transition temperature T_c (a temperature below which the resistivity of a metal or alloy becomes zero and a persistent electric current starts flowing through that metal or alloy), then too, a change of flux takes place (known as the Meissner effect[7]). The magnetism generated in the specimen at its transition temperature is supposed to be diamagnetism.

Therefore, the magnetism generated in the current carrying specimen should also be diamagnetism.

4.5 Confirmation of that the directions of L_s of electrons in their beams and current carrying rods are oriented when electrons start flowing through them

If we take an iron bar and place it in magnetic meridian of the earth's magnetic field, i.e. parallel to the direction of the earth's magnetic field; we find no change in the form/shape of the lines of force of the earth's magnetic field near the bar. The lines of force of the earth's magnetic field, which were earlier passing through the space where now the bar has been placed, pass through the bar. But if, after magnetising the iron bar or a similar bar magnet is placed in the same position of the earth's magnetic field such that its north pole lies towards the magnetic north pole of the earth's magnetic field and vice versa, we find that the magnetic lines of force of the earth's magnetic field are now expelled out from the bar. The expulsion of magnetic lines of force of the earth's magnetic field from the bar takes place because when the bar is magnetized, its lines of force are generated, and according to the property of magnetic lines of force, since magnetic line of force neither intersects itself nor other lines of force, the lines of force of the earth's magnetic field are expelled out from the bar in order to avoid intersection.

Similarly, when the lines of force of external magnetic field are expelled out from the specimen as a current starts flowing through it (previous experiment, Sec. 4.4), it means, some magnetic field has generated in the specimen of which the lines of force are so oriented and aligned that they block the lines of force of the external magnetic field, i.e. of the magnetic field generated around the steady current carrying primary coil to pass through the specimen, consequently they are expelled out from the specimen as shown in Fig. 6 (if the specimen is in the form of a straight rod). Since the magnetic field

of which the lines of force block the lines of force of the external magnetic to pass through the specimen is generated when the current, or can say the free electrons of the specimen start flowing through it, it means, the magnetic fields the electrons possess are oriented and aligned such that they block the lines of force of the external magnetic field to pass through the specimen. Other than electrons, there exists no source which possesses magnetic field and that's magnetic field can be set responsible for blocking the external magnetic field.

It is therefore confirmed that when the current starts flowing through the specimen, the magnetic fields of its electrons are oriented and aligned. When magnetic fields of electrons of the specimen are oriented and aligned, μ_S and L_S of that's electrons are also oriented and aligned.

5. AN IMPORTANT CONCLUSION

The magnetic moment of electron (μ_S) and the magnetic moment of the current carrying rod are actually the magnetic moments, not the magnetic dipole moments, and μ_S is defined too always as magnetic moment, never as magnetic dipole moment. Because, by convention, the magnetic dipole means, the magnet has two poles- south and north. South pole is, through which the magnetic lines of force of the dipole enter the dipole and north pole is, through which the magnetic lines of force exit from the dipole. For example, the bar magnets, where, through their south poles, their magnetic lines of force enter the bar magnets and through their north poles, their magnetic lines of force exit from the bar magnets. Similarly the electronic orbits see Sec. 6.1 and Fig. 7(a), and the current carrying close loops, see Sec. 6.2 and Fig. 7(b), where through their south poles, the lines of force of their magnetic fields enter and through their north poles, the lines of force of their magnetic fields exit. While the magnetic lines of force of electron,

Fig. 1, and current carrying rod, Fig. 5(b), do not enter and exit from them, consequently no poles are created.

6. EXPLANATION OF SOME OTHER PHENOMENA RELATED WITH ELECTROMAGNETISM

6.1 Explanation of how electron orbits behave like magnetic dipoles and their magnetic north and south poles are created

Since the electron moves along the direction of its L_S , when it moves with velocity v along its orbit, marked by two long arrows in Fig. 7 (a), the direction of its L_S happens to be aligned along its orbital path (tangentially at its every point) and the planes of its magnetism and magnetic field happen to be aligned in a plane perpendicular to the direction of the orbital path, shown by circular vertical rings round the orbital path in Fig. 7(a). [In Fig. 7(a), each circular vertical ring round the orbital path is in fact consisting of several co-centric circles, but not shown in figure.] And the direction of spin motion of its magnetism and magnetic field happens to be anticlockwise (if the direction of motion of electron along its orbital path is towards the face of clock), shown by arrows along the circular vertical rings in Fig. 7(a). Now if we look at Fig. 7(a), we find that the lines of force of the magnetic field generated round the orbital path enter the space A through the upper surface of the orbit, and after exit from the lower surface of the orbit, turning round the orbit they reach again towards the upper surface of the orbit to enter through it. By convention, since it is assumed that the place near the surface of a dipole through which its magnetic lines of force enter, behaves as the south (S) pole, and the place near the surface from which the magnetic lines of force of the magnetic dipole exit, behaves as the north (N) pole, the upper surface of the orbit behaves as the south pole and lower surface as the north pole. To this dipole, the magnetic dipole moment μ_L is associated.

6.2 Explanation of how current carrying close loops behave like magnetic dipoles and their magnetic north and south poles are created

In the manner a magnetic field is generated around the current carrying rod (see Sec. 4.2), in the same manner a magnetic field is also generated if the rod is taken in the form of a close loop and that is obtained as shown in Fig. 7(b). [In Fig. 7(b), each circular vertical ring round the close loop is in fact consisting of several co-centric circles, but not shown in figure.] If we look at Fig. 7(b), we find that the lines of force of the magnetic field generated round the length (perimeter) of the current carrying close loop enter the space A through the lower surface of the close loop, and after their exit from the upper surface of the close loop, turning round the close loop they reach again towards the lower surface of the close loop to enter through it. By convention, the upper surface of the close loop behaves as the north pole and lower surface as the south pole.

6.3 Discussion

Currently, no explanation is found as to how the electronic orbits and the current carrying close loops behave like magnetic dipoles and how their two magnetic poles are created. Currently it is merely being assumed that as due to flow of charge of electrons through the current carrying rod a magnetic field is generated around it, similarly, due to flow of charge of electron during the motion of electron along its orbit and due to flow of charge of electrons along current carrying close loops, magnetic fields are generated around them and they behave as magnetic dipoles. But this assumption cannot be accepted because for electronic orbits and current carrying loops to behave as magnetic dipoles, it is necessary that the magnetic fields generated around them must occur in the manners as shown in Figs. 7(a) and 7(b), and the current assumption fails to explain it.

7. SPECULATION OF TWO IMPORTANT POSSIBLE EFFECTS AND THEIR EXPLANATION

7.1 Meissner effect and its explanation

If we take a specimen in the form of a close (e.g. circular) loop and place it in an external magnetic field with its plane perpendicular to the direction of the external magnetic field, the lines of force of the external magnetic field pass through the body of the loop, Fig. 8(a). Now, if an electric current is allowed to flow through the loop, a change in flux shall be observed similarly as if the specimen is cooled down to its transition temperature T_c and the persistent current starts flowing through the specimen, a change in flux, i.e. the Meissner effect[7] is observed (see Sec. 7.4.1, Ref. 2). Because, as the current starts flowing through the specimen, due this current, a magnetic field is generated around the body of the specimen, Fig. 7(b), and the specimen starts behaving like a magnetic dipole (see Sec. 6.2). And consequently, the magnetic lines of force of the external magnetic, which were earlier passing through the body of the specimen when no current was flowing through the specimen, shall now be expelled out from the body of the specimen and shall acquire the form, as shown in Fig. 8(b). Similarly as, if an iron bar is placed in the magnetic meridian (or in any position) of the earth magnetic field, the lines of force of the earth magnetic field pass through the body of the iron bar, whereas if the iron bar is replaced by an exactly similar bar magnet (i.e. a magnetic dipole), the lines of force of the earth magnetic field are now expelled out from the body of the bar magnet, i.e. a change in flux is observed.

7.2 Levitation of magnet above the surface of the electric current carrying close loop

As the electric current carrying specimen taken in the form of a close (e.g. circular) loop behaves like a magnetic dipole, if on its surface, a thick disc (e.g. circular)

type of magnetic dipole is placed, the disc shall experience a force of attraction or repulsion. If their similar poles lie facing to each other, the disc shall experience a force of repulsion, and if opposite poles lie facing to each other, the disc shall experience a force of attraction. If their similar poles lie facing to each other and the mass of the disc is such that it may be lifted above due to the force of repulsion on it, the disc shall be levitated up above the surface of the electric current carrying dipole. It shall be similar to if above a persistent current carrying specimen a magnet is placed, the magnet is levitated up above the surface of the persistent current carrying specimen (see Sec. 7.4.2, Ref. 2).

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REFERENCES

1. Kunwar Jagdish Narain, A new force with characteristics of nuclear force and both attractive and repulsive components, vixra: 1207.0109 (Nuclear and Atomic Physics), http://vixra.org.
2. Kunwar Jagdish Narain, Understanding superconductivity: A new approach, vixra: 1111.0097 (Condensed Matter), http://vixra.org
3. Kunwar Jagdish Narain, Understanding deuterons, alpha particles and nuclei: A new approach, vixra: 1203.0105 (Nuclear and Atomic Physics), http://vixra.org.
4. Kunwar Jagdish Narain, A new interpretation to quantum theory, Phys. Essays 22 (2009) p. 47. Also available at http://physicsessays.aip.org.
5. Kunwar Jagdish Narain, Why and how do electrons, nucleons etc. all the particles possess persistent spin motion, vixra: 1512.0331 (Nuclear and Atomic Physics), http://vixra.org.
6. Kunwar Jagdish Narain, A new neutron model, vixra: 1512.0330 (Nuclear and Atomic Physics), http://vixra.org.
7. W. Meissner, and R. Ochsenfeld, Ein neuer Effekt bei Eintritt der Supraleitfahigkeit, Naturwissenschaften 21 (1933) p. 787.

FIGURE CAPTIONS

Fig. 1: (a) Spherical ball, dark solid line circle and concentric broken line circles respectively represent the charge, magnetism and magnetic field of electron. (b) Transverse cross sectional view of electron, where, in order to introduce arrow marks with the ball of charge to show the direction of its spin motion, the ball of charge has been shown by a dark thick solid line circle in place of a dark disc.

Fig. 2: Transverse cross-sectional view of interaction between the magnetic fields of electrons moving with velocity v in their beam

Fig. 3 (a) Transverse cross-sectional view of the magnetic field generated around the electron beam. (b) Longitudinal view of the magnetic field generated around and along the length of the electron beam moving with velocity v.

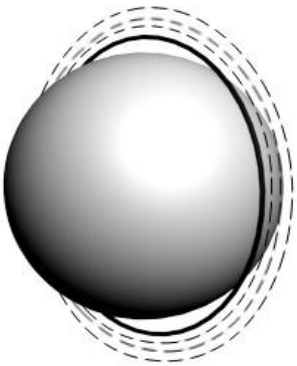
Fig. 4 Transverse cross-sectional view of interaction between the magnetic fields generated around the electron beams passing through the different inter-lattice passages of the specimen, where the lattices have been shown by small solid dark discs.

Fig. 5 (a) Transverse cross-sectional view of the magnetic field generated around the specimen. (b) Longitudinal view of the magnetic field generated around and along the length of specimen carrying current i..

Fig. 6: Longitudinal view of the ejection of magnetic lines of force of the external magnetic field B from the specimen carrying current i.

Fig. 7: (a) Longitudinal view of the magnetic field generated around and along the length (perimeter) of an orbit of electron moving with velocity v along its orbit. (b). Longitudinal view of the magnetic field generated around and along the length (perimeter) of specimen taken in the form of a close loop carrying current i

Fig. 8 (a) Magnetic lines of force of the external magnetic field passing through the body of specimen when no current is flowing through it. (b) Ejection of the magnetic lines of force from the body of specimen when the current i starts flowing through it.



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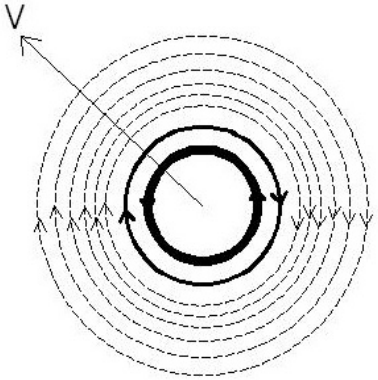
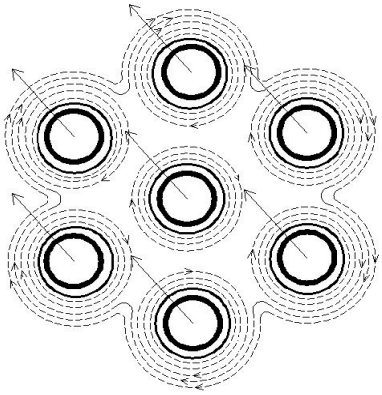


(b)

Fig. 1



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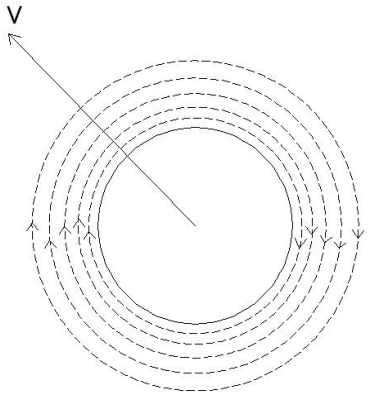

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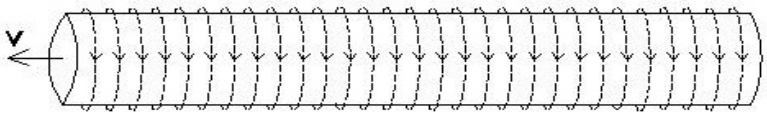

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Fig. 3

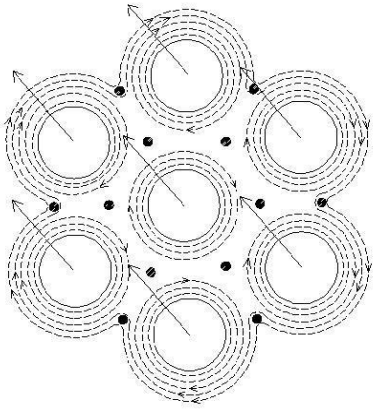
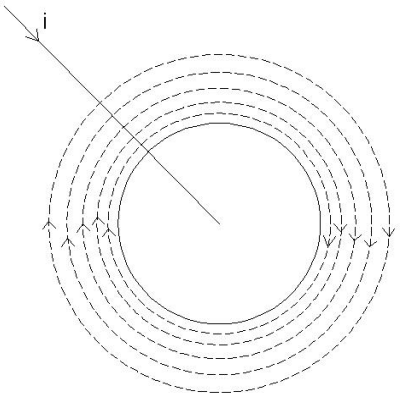


Fig. 4



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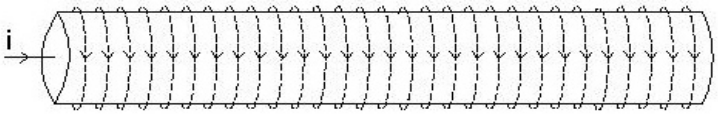


(b)

Fig. 5

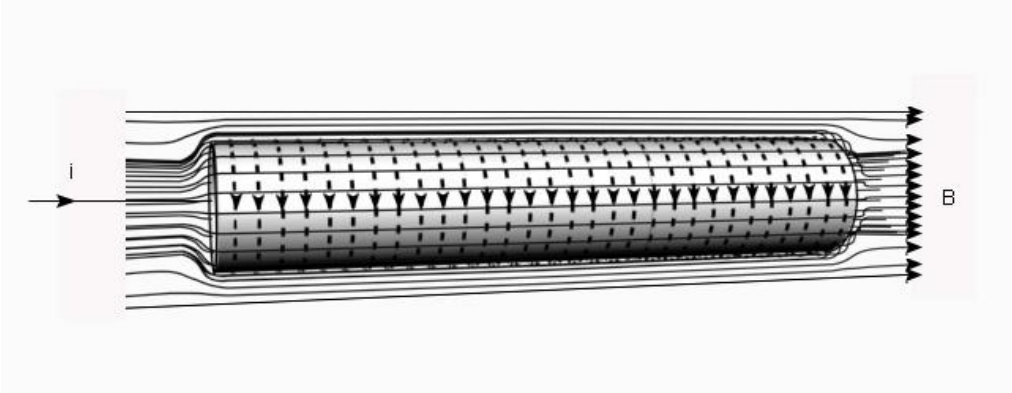
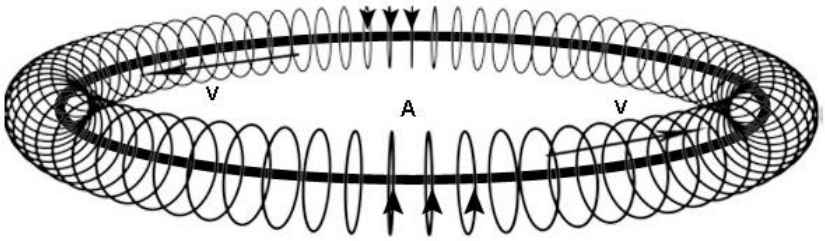


Fig. 6



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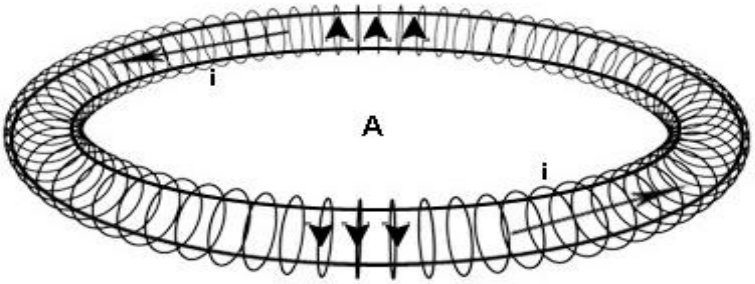
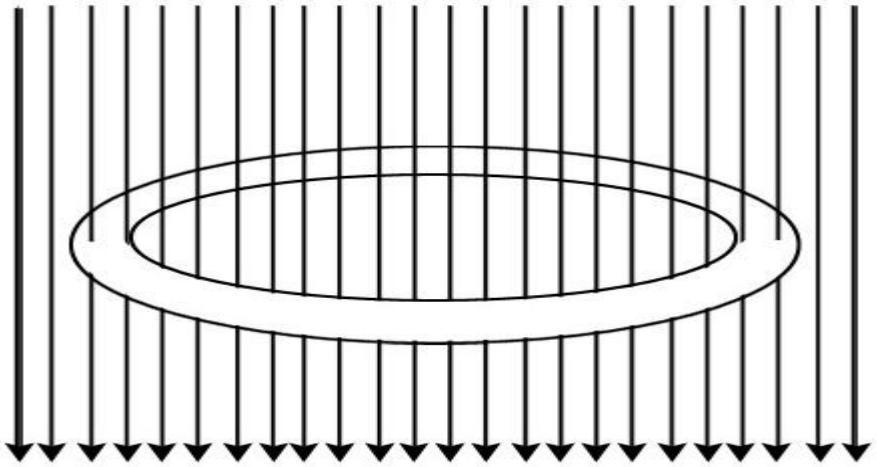


(b)

Fig. 7



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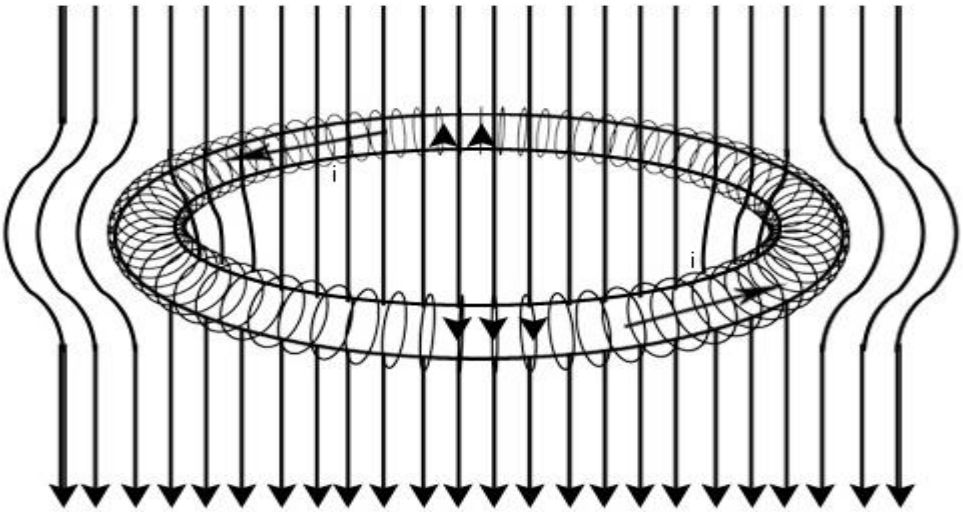

(b)

Fig. 8